University of Hawaii at Manoa

Hawaii Natural Energy Institute
Holmes Hall 246 • 2540 Dole Street • Honolulu, Hawaii 96822

September 21, 1990

Mr. Duane Kanuha
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Kanuha:

As required in the County of Hawaii Planning Commission's geothermal resources permit (GRP 89-1), we have enclosed five (5) copies each of the August monthly report.

If you have any questions, please call me at 522-5620, or Art Seki at 956-2338.

Sincerely,

Harry Olson
SOH Principal Investigator

Enclosure: August monthly reports

AUGUST 1990 MONTHLY REPORT

Scientific Observation Hole (SOH) Program

Geothermal Resource Permit: GRP 89-1

Lilewa, Kapoho, and Halekamahina, Hawaii

TMK: 1-2-10:01; 1-4-01:02; and 1-4-02:32

Hawaii Natural Energy Institute

University of Hawaii

September 1990

SUMMARY

This document presents a monthly report to the County of Hawaii Planning Department to support the Scientific Observation Hole (SOH) program in the Kilauea middle and lower east rift zones. The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. The information to be gained from the SOHs will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

This report addresses: occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility; performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed; and emission measurements.

I. INTRODUCTION

The County of Hawaii Planning Commission approved, on August 8, 1989, a geothermal resource permit application (GRP 89-1) to drill scientific observation holes (SOHs) in the Kilauea middle and lower east rift zone. This document presents a monthly report, as required in condition 6:

> "The petitioner shall maintain a record in a permanent form suitable for inspection and five (5) copies shall be filed with the Planning Department on a monthly basis during drilling and for six (6) months after the completion of drilling to establish a hole specific baseline and such record shall be available to the community. The record shall include:
>
> a. Occurrence and duration of any start-up, shut-down, and operation mode of any SOH/facility.
>
> b. Performance testing, evaluation, calibration checks, and adjustment and maintenance of the continuous emission monitor(s) that have been installed.
>
> c. Emission measurements reported in units compatible with applicable standards/guidelines."

II. BACKGROUND

The SOHs are for scientific observation purposes only. The holes <u>will not be flow-tested or produced</u>. As designated, four holes are planned on the Big Island of Hawaii. Three of the Big Island holes (SOHs 1, 2, and 4) are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH 3, is on conservation land. SOH

activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell has been approved.

III. SOH 4 SITE

Drilling Activity

Drilling completed -- no activity for this period.

Monitoring Program - Air Quality

Drilling completed -- no activity for this monitoring program.

Monitoring Program - Meteorological

Drilling completed -- no activity for this monitoring program.

Monitoring Program - Noise

Drilling completed -- no activity for this monitoring program.

Emissions Reports

Drilling completed -- no activity for this monitoring program.

IV. SOH 1 SITE

Drilling Activity

Tonto drilling services continued drilling activities to a depth of 2230 feet for this reporting period. The drilling penetration rate was reduced due to a stuck drill bit and rods in an unconsolidated zone. The drill bit ultimately was removed for normal drilling.

Monitoring Program - Air Quality

The air quality monitoring station provides a continuous record of atmospheric H_2S concentrations when interfaced with a data logger or chart recorder. The unit is located in a utility container on-site and power is provided by the drill rig system.

Due to brief power outage during this period, total data capture was about 99 percent (see Appendix for details).

Monitoring Program - Meteorological

Continuous wind speed and direction measurements are being made with a recording wind speed/direction sensor system. A data logger and back-up pressure-sensitive recorder is being used to record the wind speed and direction data. The unit is located in a utility container on-site, and power is provided by the drill rig system.

Brief power outage caused for some loss in data. However, total data capture was near 100 percent (see Appendix for details).

Monitoring Program - Noise

One noise monitoring station is located at the SOH 1 site during drilling. This system operated normally throughout the report period. Brief power outage caused some loss of data.

A second noise station is located at the Laughlin residence, about a quarter mile west of SOH 1 drill site. Minor corrosion problems continue to

cause loss of data. Key equipment components have been cleaned or replaced. Otherwise, this system has operated normally.

A third noise monitoring station is installed at the Pommerenk's residence, about a mile east of the SOH 1 site. Due to the lack of AC power on-site, this monitoring system is powered by batteries. Modifications were made in the system to reduce current load. Minor technical problems with the chart recorders have occurred. A tape recorder has been located on-site for the residents to use during potential noise violations (see Appendix for details).

Emissions Reports

H_2S monitor is located on-site. The average H_2S level measured is about 1 ppb. The Colortek sensors show no indication of any emissions from the well.

V. SOH 3 SITE

No drilling activity was conducted at the site. Preliminary work for drill site access has been initiated. SOH 3 is scheduled to be located at the True/Mid-Pacific alternate drill site 2 (approximately 3,000 feet norht-north-west of the present drill site).

VI. SOH 2 SITE

Drilling activity has not been initiated. Ambient noise monitoring is being prepared for SOH 2 site. Findings of the flora/fauna field surveys were submitted to County of Hawaii Planning Department. The permit application was

approved by Department of Land and Natural Resources to inspect, modify, and if practical install a pump into an existing well to supply water for drilling operations.

A grading and grubbing permit application has been submitted to the County of Hawaii Planning Department.

APPENDIX

MAINTENANCE REPORT

ALPHA MICROSYSTEMS

1550 Akolea Place
Hilo, Hawaii 96720
(808) 935-7985

HAWAII NATURAL ENERGY INSTITUTE
2540 Dole Street
Honolulu, HI 96822

Attn Arthur S. Seki

September 6, 1990

Dear Art,

This report covers the period Aug. 1, to Aug. 31, 1990.

GILMAN HAI. There were brief power outages on Aug. 11 and 13 resulting in the loss of 7 hours data. Also the Lead Acetate tape ran out on Aug 26-27 causing the loss of an additional 27 hours. The analyzer however, operated normally during the month and calibrations required only minor corrections. Data capture was 95%.

SOH-1 HAI. This instrument operated normally throughout the entire month except for 7 hours data loss due to power outages. Calibrations were routine and required only minor adjustments. Data capture was 99%.

WOODS HAI. The analyzer at this station was in normal operation throughout the month. There were no problems. Calibrations were standard and routing. Data capture was 100%.

WOODS MET. All parameters operated normally during the entire month. Good calibrations and no data gaps. Data capture was 100%.

T.P.MET. This station also operated normally throughout the entire month requiring only routine maintainence. Data capture was 100%.

SOH-1 MET. This station operated normally during the entire month with only minor data gaps during brief shutdowns for Rig maintainence. Calibrations were routine. Data capture wa 100%.

SOH-4 COLORTEK. These cards were routinely replaced and did not give any indications of color change.

Enclosed:

H2S Data Reduction for Gilman, SOH-4 and Woods Stations for August 1990.
Average, Maximum and total H2S for the above stations.

Meteorological Data Reduction for Woods, T.P., and SOH-1. August 1990.

Synopsis of Woods and T.P. Met Data for August, 1990.

Copy of Station Logs, August, 1990.

September Invoice

NAME EXPERIMENT NO.

J-215 Friday 8-3-90

Woods HAI Range 0-3 ppb

Flow Steady @ 3.0, chart & Tape OK

Tygon Dry - Filled Bubbler - Pump OK

Check 23.1%, steady

Optics 1570-1580, down 10 ea, No Adj:

	Range	High	Lil	Low	Lil
Zero Calib	22	4	1	1	0

Weeds Met

Operating Normally - Chart & Rain Gage OK

I.P. Met

Operating Normally - Chart & Batt OK

SOH-1 Met

Operating Normally - Chart OK

Ellman HAI Range 0-3 ppb

Flow Steady @ 3.0, chart & Lead Acetate OK

Tygon Dry - Filled Bubbler - Pump OK

Check 19.9%, down .2%

Optics 1930-1970, ~~Left~~ up 10 ea, ~~Adj~~. adj To 1920-1920

	Range	High	Lil	Low	Lil
Zero Calib	18	7	-3	1	0

SOH-1 HAI Range 0-2 ppb

Flow Steady @ 3.0, chart & Lead Acetate OK

Tygon Dry - Pump & Bubbler OK

Check Steady @ 24.2%

Optics Steady @ 1870-1870

	Range	High	Lil	Low	Lil
Zero Calib	23	8	3	1	0

Colontek

Replaced Colontek Cards - No apparent Color Change

NAME EXPERIMENT NO.

J-218 Monday 8-6-90

Woods HAI Range 0-3ppb

Flow adjusted to 3.0, chart + lead Acetate O.K

Typan Dry - Pump + Bubbler OK

Check 23-2%, up .1%

Optics 1790-1580, down 10-, No adj.

Range - High 1:1 Low 1:1

Zero Calib 21 4 1 0

Woods Met

Operating Normally - Chart OK - Recalib Temp (No adj necessary)

T.E. Met

Operating Normally - Chart + Both O.K

SOH-1 Met

operating Normally - Chart OK

Gilson HAI Range 0-3ppb

Flow Steady @ 3.0, chart + lead Acetate O.K

Typan Dry - Pump + Bubbler O.K

Check 19.9%, down .2%

Optics 1930-1920, down 10-, No adj.

Range - High 1:1 Low 1:1

Zero Calib 18 5 1 0 0

SOH-1 Met Range 0-2ppb

Flow Steady @ 3.0, chart + Lead Acetate OK

Typan Dry - Pump + Bubbler O.K

Check - Adjusted to 22.1%

Optics Steady @ 1890-1890

Range - High 1:1 Low 1:1

Zero Calib 22 4 1 1 0

Span Calib - Exp 50 50 50 50 (span pot) 50 50

Act 24 37 45 47 (Right) 51 50

NAME EXPERIMENT NO.

J-220 Wednesday 8-8-90

Woods HAT Range 0-3 ppb

Flow Steady @ 3.0, Renewed Chart - Lead Acetate OK

Tygon Dry - Filled Bubbler - Pump OK

Check 23.5%, up .3%

Optics 1600-1590, down 10 ea, No Adj.

Range - High 1:1 Low 1:1

Zero Cal/p 22 6 2 0 0

Woods Met

Operating Normally - Renewed Chart

T.P. Met

Operating Normally - Chart + Batt OK

30 H-1 Met

Operating Normally - Chart OK

Bolman HAT Range 0-3 ppb

Flow adjusted to 3.0, Renewed Chart - Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 20.3%, up .4%

Optics 1930-1940, up 10 ea, adj to 1940-1940

Range High 1:1 Low 1:1

Zero Cal/s 19 0 3 0 0

50 H-1 HAT Range 0-3 ppb

Flow adjusted to 3.0, Renewed Chart - Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 29.0%, up .9%

Optics 1900-1910, up 10 ea, adj to 1910-1910

Range - High 1:1 Low 1:1

Zero Cal/s 26 11 0 ± (Zero Pot Finish Right) 0

NAME EXPERIMENT NO.

J-222 Friday 8-10-90

Woods HAI Range Ø - 3ppb

Flow steady @ 3.0, chart + Tape OK

Tygon Dry - Pump + Bubbler OK

Check steady @ 23.5%

Optics steady @ 1900-1900

Range- High 1:1 Low 1:1

Zero Calib 22 5 Ø -1 (Zero for Tweak Right) Ø

Span Calib - Exp 50 50 50 50 50

Act 34 47 49 59 50

Woods Met.

Operating Normally - Chart OK - Cleaned + Bal. Rain Gage

T.P. Met

Operating Normally - Renewed Chart - Bal & O.K. @ 1220

500'-1 Met

Operating Normally - Renewed chart

Gilman HAI Range Ø - 2 ppb

Flow Steady @ 3.0, chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 19.9%, down .4%

Optics steady @ 1950-1950

Range High 1:1 Low 1:1

Zero Calib 18 10 3 1 1 (Zero for Tweak Left) Ø

500'-1 HAI Range Ø - 3ppb

Flow Steady @ 3.0, chart + Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 28.9%, down .1%

Optics Steady @ 1920-1920

Range- High 1:1 Low 1:1

Zero Calib 21 6 3 Ø

Colortek

Repaired Colortek Leads - No Visible Color Change.

NAME EXPERIMENT NO.

Δ-225 Monday 8-13-90

Woods HAE Range Ø – 3 ppb

Flow Steady @ 3.0, chart OK - Replaced lead Acetate

Tygon Dry - Filled Bubbler - Cleaned Sample Chan.

Check Steady @ 23.5%

Optics Steady @ 1590-1590

Range- High 1:1 Low 1:1

Zero Calib 20 8 1 Ø

Woods Met

Operating Normally - chart OK

T.P. Met

Operating Normally - chart + Batt O.K.

SOH-1 Met

operating Normally - Replaced Chart

Gilmon HAE Range Ø – 2 ppb

Flow Steady @ 3.0, Chart O.K. - Replaced lead Acetate

Tygon Dry - Pump + Bubbler OK. - Cleaned sample Chamb.

Check 19.7%, up .2%

Optics 1940-1950, up 10 ea, adj to 1950-1950

Range- High 1:1 Low 1:1

Zero Calib 19 5 4 Ø Ø

Span Calib- exp 50 50 50 50 (cycle time) 50

Act 29 41 48 49 (½ Right) 50

SOH-1 HAE Range Ø – 2 ppb

Flow Steady @ 3.0 Chart O.K. - Replaced lead Acetate

Tygon Dry - filled Bubbler - Cleaned Sample Chamb.

Check 28.3%, down .6% + cycle time ½ Right

Optics 1910-1930, up 20 ea, adj to 1930-1930

Range- High 1:1 Low 1:1

Zero Calib 26 5 2 1 Ø

NAME EXPERIMENT NO.

J-227 Wednesday 8-15-90

Woods HAI Range 0 - 3 ppb

Flow Steady @ 3.0, Renewed Chart - Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 23.5% - Steady

Optics Steady @ 1600 - 1600

Range - High 1:1 Low 1:1

Zero Calib 22 4 0 1 0

Woods Met

Operating Normally - Replaced Chart

T.P. Met

Operating Normally - Chart + Batt OK

SOH-1 Met

Operating Normally - Chart OK

Gilman HAI Range 0 - 2 ppb

Flow steady @ 3.0, Renewed Chart - Lead Acetate OK

Drained Tygon - Pump + Bubbler OK

Check 19.9%, - Steady

Optics steady @ 1950 - 1950

Range - High 1:1 Low 1:1

Zero Calib 18 4 3 2 0

SOH HAI Range 0 - 3 ppb

Flow Steady @ 3.0 Renewed Chart, Lead Acetate OK

Tygon Dry - Pump + Bubbler OK

Check 28.4%, up .190

Optics 1950 - 2000, up 50 =, adj to 2000 - 2000

Range - High 1:1 Low 1:1

Zero Calib 26 9 2 1 0

NAME EXPERIMENT NO.

T-229 Friday 8-17-90

Woods HAI Range 0 - 3ppb
Flow steady @ 3.0, chart + lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check 23.4%, down .1%
Optics steady @ 1600-1600
Range- High 1:1 Low 1:1
Zero Calib 22 ± 2 0 0

Woods Met Range
Operating Normally, chart O.K
T.P. Met
Operating Normally - Renewed Chart - Batt 12.0V
SOH-1 Met
Operating Normally - Renewed chart

Gilmon HAI Range 0 - 2ppb
Flow Steady @ 3.0, Chart + lead Acetate O.K
Tygon Dry - Pump + Bubbler OK
Check steady @ 19.8%
Optics 1960-1950, down 10 ±, No adj.
Range- High 1:1 Low 1:1
Zero Calib 18 7 ± 0 0

SOH-1 HAI Range 0 - 3ppb
Flow Steady @ 3.0, chart + lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 28.1%, down .3%
Optics 2010-2050, up 40 ±, adj to 2050-2050
Range - High 1:1 Low 1:1
Zero Calib 26 7 ± 0 0
Span Calib - Exp 50 50 50 50 } No Adj
Act 33 47 50 50

Colantek
Replaced Colantek Cards - No color change visible

NAME EXPERIMENT NO.

J-232 Monday 8-20-90

Woods HAI Range 0-3 ppb
Flow steady @ 3.0, chart + Lead Acetate O.K
Tygon Dry - Filled Bubbler - Pump O.K
Check steady @ 23.4%
Optics 1610-1620, up 10 -, adj to 1620-1620
Range - High 1:1 Low 1:1
Zero Calib 9 6 2 0 0
Span Calib - Exp 50 50 50 50 (Span Pot 50
Act 31 40 49 51 Fully Left) 50

Woods Met
Operating Normally - Chart O.K
T.P. Met
Operating Normally - Chart + Batt O.K
SOH-1 Met
Operating Normally - Chart O.K

Gilman HAI Range 0-3 ppb
Flow steady @ 3.0, Chart + Lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 20.1%, up .3%
Optics 1950-1980, up 30 -, adj to 1980-1980
Range - High 1:1 Low 1:1
Zero Calib 19 4 3 0

SOH-1 HAI Range 0-3 ppb
Flow steady @ 3.0, chart + lead Acetate O.K
Drained Tygon - Filled Bubbler - Pump O.K
Check steady @ 28.1%
Optics 2020-2060, up 40 -, adj to 2060-2060
Range - High 1:1 Low 1:1
Zero Calib 4 8 3 0 0

NAME EXPERIMENT NO.

J-234 Wednesday 8-22-90

Woods HAI Range ø-3

Flow steady @ 3.0, Renewed Chart, Lead Acetate OK
Drained Tygon - Pump + Bubbler OK
Check 23.3 %, down .1%
Optics 1400-1500, down 20 ea, adj to 1580-1580
Range - High 1:1 Low 1:1
Zero Calib 20 4 1 ø

Woods Met

Operating Normally - Renewed Chart

IP Met

Operating Normally - Chart + Batt OK

SOH-1 Met

Operating Normally - Chart OK

Gilman HAI Range ø-3 ppb

Flow Adj: To 3.0, Replaced Chart - Lead Acetate OK
Tygon Dry - Pump + Bubbler OK
Check 19.9 %, down .2%
Optics 1990-1950, down 40 ea, adj to 1950-1950
Range - High 1:1 Low 1:1
Zero Calib 18 8 2 ø

SOH-1 HAI Range ø-3 ppb

Flow Steady @ 3.0, Renewed Chart - Lead Acetate OK
Tygon Dry - Pumps - Bubbler OK
Check Steady @ 28.1%
Optics 2060-2080, up 20 ea, adj to 2080-2080
Range: High 1:1 Low 1:1
Zero Calib 26 13 1 ø

NAME EXPERIMENT NO.

J-236 Friday 8-24-90

Woods HAI Range Ø-3

Flow Steady @ 3.0, Replaced Chart, Lead Acetate O.K

Tygon Dry - Filled Bubbler - Pump O.K

Check 23.5%, up .2%

Optics 1590-1600, up 10 ~, adj to 1600-1600

Range High 1:1 Low 1:1

Zero Calib 3 1 2 Ø Ø

Woods M-T

Operating Normally - Chart O.K

TP M-T

Operating Normally - Renewed Chart - Replaced Battery

SOH-1 M-T

Operating Normally - Renewed Chart

Gilmer HAI Range Ø-3ppb

Flow steady @ 3.0, Chart + Lead Acetate O.K

Tygon Dry - Pump & Bubbler O.K

Check 19.8%, down .1%

Optics 1950-1980, up 30 ~, adj to 1980-1980

Range High 1:1 Low 1:1

Zero Calib 9 16 3 1 1 (Zero Pot Front Left) Ø

Span Calib Exp 50 50 50 50 (Cycle Time) 50

Act 30 41 48 49 (1/2 Right) 50

SOH-1 HAI Range Ø-3ppb

Flow steady @ 3.0, Chart + Lead Acetate O.K

Tygon Dry - Pump + Bubbler O.K

Check steady @ 28.1%

Optics 2110-2120, up 10 ~, adj to 2120-2120

Range High 1:1 Low 1:1

Zero Calib 5 9 4 1 Ø

NAME EXPERIMENT NO.

J-239 Monday 8-27-90

Woods HAI Range 0-3 ppb
Flow Steady @ 3.0, chart O.K. - Replaced lead Acetate
Tygon Dry - Pump + Bubbler O.K. Cleaned sample Chamb.
Check 22.3%, down .2%
Optics 1590-1600, up 10 ~, adj to 1600-1600
Range- High 1:1 Low 1:1
Zero Calib 20 8 3 1 0

Woods Met
Operating Normally - chart O.K
IP Met
Operating Normally - Replaced Chart - Replaced Batt 1291
SOx-1 Met
Operating Normally - chart O.K

Gilmen HAI Range 0-2 ppb
Flow Steady @ 3.0, chart O.K. - Replaced lead Acetate
Tygon Dry - Pump + Bubbler O.K - Cleaned sample Chamb.
Check 18.8%, down 1%, - adj cycle Time 1/2 Right
Optics 1980-1970, down 10 ~, No Adj.
Range- High 1:1 Low 1:1
Zero Calib 18 5 2 0

SOx-1 HAI Range 0-2 ppb
Flow Steady @ 3.0, chart O.K. - Replaced lead Acetate
Tygon Dry - Pump + Bubbler - O.K. - Cleaned Sample Chamb.
Check 28.0%, down 1%
Optics Steady @ 2110-2110
Range- High 1:1 Low 1:1
Zero Calib 27 4 3 2 0
Span Calib - Exp 50 50 50 50 (cycle Time 1/4 Right) 50
Act 26 40 48 48 50

NAME EXPERIMENT NO.

S-241 Wednesday 8-29-90

Woods HAI Range 0-3ppb
Flow Steady @ 3.0, Renewed Chaut, lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 22.2%, down .1%
Optics 1600-1590, down 10 a, No Adj:
Range- High 1:1 Low 1:1
Zero Calib 20 4 2 0 0
Span Calib- Exp 50 50 50 50 50
Act 29 36 47 49 50

Woods Mct
Operating Normally - Renewed Chaut
T.P. Mct
Operating Normally - Chaut + Bot O.K
SOH-1 Mct
Operating Normally - Chaut O.K

Gilman HAI Range 0-3ppb
Flow steady @ 3.0, Replaced Chaut, Lead Acetate O.K.
Tygon Dry - Filled Bubbler - Pump O.K
Check 28.1% up .1%
Optics Steady @ 2120-2120
Range- High 1:1 Low 1:1
Zero Calib 25 5 0 1 0

SOHI HAI Range 0-20ppb
Flow Steady @ 3.0, Renewed Chaut, Lead Acetate O.K
Tygon Dry - filled Bubbler - Pump O.K
Check 19.0%, up .2%
Optics 1980-1940, down 40 a, adj to 1960-1960
Range- High 1:1 Low 1:1
Zero Calib 18 N 2 0

EXPERIMENT NO.

J-243 Friday 8-31-90

Woods NAI Range 0-3ppb
Flow steady @ 3.0, chart + lead Acetate O.K
Tygon Dry - Pump + Bubbler O.K
Check 21.6%, down .6%
Optics steady @ 1610-1610
Range High 1:1 Low 1:1
Zero Calib 19 4 3 0 0

Woods MET
Operating Normally - Renewed Chart
T.P. MET
Operating Normally - chart + Batt O.K.
SOH-1 MET
Operating Normally - Renewed Chart

Gilman NAI Range 0-3ppb
Flow steady @ 3.0, chart + lead Acetate O.K.
Tygon Dry - Filled Bubbler - Pump O.K
Check 19.4% up .2%
Optics 1960-1950, down 10-, No Adj.
Range - High 1:1 Low 1:1
Zero Calib 19 5 1 0 1 (Zero Pot 1/2 Left) 0
Span Calib - Exp 50 50 50 50 (Span Pot 1/4 Left) 50
Act 36 47 50 51 (1/4 Left) 50

SOH-1 NAT Range 0-3ppb
Flow steady @ 3.0 chart + lead Acetate OK
Tygon Dry - Pump + Bubbler O.K
Check 24.9%, down .2%
Optics 2130-2150, up 20-, adj to 2150-2150
Range High 1:1 Low 1:1
Zero Calib 2 8 2 0

Colortec
Replaced Colortec Cards - No Color Change Visible

SUPLEMENTARY BILLING

J-215 Friday, 8-3-90 3.00

SOH-1

Full zero and span calibration of both sound meter and Recorder. Minor adjustments. Power was off at first visit.

LOUGHLIN

Normal operation. Full zero and span calibration of meter and recorder. Minor adjustments.

POMERINCK

Made arrangements with Debbie Pomerinck for installation of Sound instruments on Monday. She will provide space under front porch for batteries, recorder and meter. Microphone to be installed on porch post in direct line facing SOH-1.

COLORTEC

Replaced colortec cards. No visible color change.

J-218 Monday, 8-6-90 3.00

SOH-1

Operating normally. No problems.

LOUGHLIN

Station recording, but found loose and corroded Jack at connection between recorder and meter. Cleaned, tested and replaced. May have been cause of noisy trace on recorder.

POMERINCK

Installed instruments and batteries. Ran calibration check on Meter and recorder.

J-220 Wednesday 2.00

SOH-1

Operating normally. Replaced pen. Adjusted recorder.

LOUGHLIN

Operating normally. Chart and pen O.K.

POMERINCK

2 chart jams...some data lost. May have to make adjustments to chart-drive belt if jams continue.

J-222 Friday, 8-10-90 3.50

SOH-1

Operating normally. Calibrated Meter and recorder.

POMERINCK

Chart jammed. Collected very little data. Dismantled recorder to adjust, but found no mechanical problem. Reassembled, calibrated recorder and meter and am hoping for the best but expecting the worst.

LOUGHLIN

Operating normally. Calibrated meter and recorder.

J-225 Monday, 8-13-90 2.00

SOH-1

Operating normally. Exchanged chart recorder with the recorder from Pomerinck's.

POMERINCK

Chart jammed again as expected. Little data collected. Replaced recorder with the one from SOH-1 in an attempt to localize the problem.

LOUGHLIN

Operating normally. Chart and pen O.K.

J-227 Wednesday, 8-15-90 2.50

SOH-1

Operating normally. No problems. Renewed chart.

POMERINCK

Chart jammed again. No data. Upon testing electrical system, discovered heave corrosion on input jack from battery to recorder. Cleaned and tested. O.K.

LOUGHLIN

Operating normally. Replaced pen, renewed chart.

J-229 Friday, 8-17-90 6.00 143.09

Purchased Tape-recorder, Microphone and tapes from Radio Shack, and a trickle charger and battery from Western Auto.

SOH-1

Pen ran dry, some data lost. Full Calibration

POMERINCK

Operating normally. Replaced batteries, Calibrated

LOUGHLIN

Operating normally. Checked calibration, then removed chart recorder and sound meter for bench testing and modifications.

SPECIAL

Ran current-draw tests on chart recorder, tape recorder, Sound meter, and voltage converters (12 volt to 9 volt) in order to judge size of solar panel required.

J-230-231 Saturday & Sunday 5.00 15.47

SPECIAL

Designed, built & tested low current draw converter. Works great. Cuts current draw 60%. Tested trickle charger and battery for SOH-1 station. Works great. Tested tape-recorder control settings and microphone placement to insure accuracy of playback. Purchased Schottky diodes and misc. hardware to make converter and to run tests.

J-232 Monday, 8-20-90 2.50

SOH-1

Operating normally. Installed Trickle charger and battery. No more problems with power outages.

POMERINCK

Operating normally but pen ran dry. Replaced pen. Batteries, and installed new converter. Batteries should now last close to 2 weeks.

LOUGHLIN

Reinstalled Sound meter and Chart recorder. Tested calibration and general operation.

J-234 Wednesday, 8-22-90 2.00

SOH-1

Much data lost because of power outages at instrument shelter caused by excessive moisture. Taped connections and believe that this will cure problems.

POMERINCK

Operating normally. Batteries O.K.

LOUGHLIN

Operating normally.

J-236 Friday, 8-22-90 3.00

SOH-1

Much data lost because of dead battery. Charger is unable to keep up with the load from the recorder. Reconnected recorder to 110 through a converter. Ran full calibration with only minor corrections.

POMERINCK

Operating normally. Installed Tape recorder and instructed Debbie Pomerinck in its use. Ran a full calibration on Meter and chart recorder.

LOUGHLIN

Operating normally. Full calibration on meter and recorder. Only minor adjustments were required.

COLORTEK

Replaced colortec cards. No visible color change.

J-239 Monday, 8-27-90 2.50

Received case of Metric charts for Chart recorder from Esterline-Angus. 330.23

SOH-1

Chart folded under and jammed. Some data lost.

POMERINCK

Replaced Chart recorder battery. Tape recorder was not used although Pomerincks heard noise Saturday.

LOUGHLIN

Garbage readings...Tested components and replaced microphone. Calibration O.K., but I'm not sure that the problem is solved.

J-241 Wednesday, 8-29-90 2.50

SOH-1

Operating normally.

POMERINCK

No data. Chart jammed. Cleared jam. Replaced sound meter batteries. Tape recorder ran from 0-238 on counter but someone tinkered with recorder controls. Academic for now because no data of chart recorder.

LOUGHLIN

No data. Garbage readings. Unable to properly test in the rain so removed instruments for repair at home.

J-242 Thursday, 8-30-90 3.00

LOUGHLIN'S INSTRUMENTS.

Extensive testing revealed the problem to be the ol bug-a-boo, corrosion and the connectors. In this case only a partial failure which caused the readings to become corrupted. Repaired...Should be O.K. now.

J-243 Friday, 8-31-90 3.00

SOH-1

Operating normally. Full calibration

POMERINCK

Operating normally. Full calibration.

LOUGHLIN

Installed instruments, Tested and Calibrated.

COLORTEK

Replaced cards. No visible color change.

STATION LOG

J-215 Friday, 8-3-90

SOH-1 0925 Clouds 100%, rain WS&DIR 300 @ 2-3
Rig was shut down on arrival (0800) so went to Pomerink residence to install new instruments. Selected site for microphone, but no shelter for meter and recorder. Mrs. Pomerink agreed to provide sheltered area and will have it ready for Monday installation. Returned to SOH-1. Station operating normally. Ran full Span and Zero calibration on sound meter and recorder. Adjusted meter to 110.0 from 110.4, and adjusted chart recorder up 2 db.

LOUGHLIN 0947 Clouds 100%, rain WS&DIR CALM
Station operating normally. Ran full Zero and Span Calibration on meter and recorder. Adjusted Meter to 110.0 from 109.8 and adjusted chart recorder down 2 db.

J-218 Monday, 8-6-90

SOH-1 0757 Clouds 75% WS&DIR 270 @ 3-5
Operating normally. No problems

LOUGHLIN 0918 Clouds 75% WS&DIR 300 @ 6-8
Found loose and corroded connection at input jack, between sound meter and recorder. Cleaned and repaired. Loose connection may account for continuous recorder pen movement.

POMERINCK 0800 Clouds 80% WS&DIR 310 @ 5-7
Installed chart recorder, sound meter and batteries under front porch. Installed Microphone on porch post on a direct line of sight to SOH-1.

J-220 Wednesday, 8-8-90

SOH-1 0815 Clouds 75% WS&DIR 90 @ 6-8
Operating normally. Replaced pen, adjusted recorder up 1 db.

LOUGHLIN 0907 Clouds 75% WS&DIR 90 @ 6-8
Operating normally. Chart & Pen O.K.

POMERINCK 0838 Clouds 80% WS&DIR 60 @ 5-7
There were two chart jams. One cleared itself but the second one stayed jammed until I arrived. May have to dismantle chart recorder and loosen drive belt tension it this keeps up. Some data was lost because of the jams, but data seems to be good. I forgot to install the wind-screen on the microphone Monday, so readings may be higher than normal between Monday and Wednesday. Installed wind-screen today.

J-222 Friday, 8-10-90

SOH-1 0915 Clouds 80% WS&DIR 50 @ 6-8
Operating normally. Calibrated sound meter to 110.0 from 110.5. Adjusted recorder down 1 db.

POMERINCK 0945 Clouds 100%, rain WS&DIR 50 @ 5-6
Chart jammed a few hours after I left Wednesday. Very little data collected. Dismantled recorder to adjust chart drive belt tension but found that it was O.K. Reassembled and am hoping for the best. Ran a full calibration. Sound meter right-on. Recorder 2 db low.

LOUGHLIN 1026 Clouds 100% WS&DIR 20 @ 4-5
Operating normally. Calibrated meter to 110.0 from 109.9. No adjustment required for recorder.

J-225 Monday, 8-13-90

SOH-1 0758 Clouds 15% WS&DIR 355 @ 3-5
Operating normally. Removed recorder to be exchanged with the new recorder at Pomerincks.

POMERINCK 0825 Clouds 15% WS&DIR 350 @ 3-5
Chart recorder jammed again as expected. Very little data was collected. Replaced chart and installed recorder that was removed from SOH-1. Hopefully this will work. Installed recorder from Pomerinck's at SOH-1. The only difference in the operation of these recorders is that one operates only off of a battery and the other operated off of a converter.

LOUGHLIN 0937 Clouds 50% WS&DIR 40 @ 4-7
Operating normally. Chart & Pen O.K.

J-227 Wednesday, 8-15-90

SOH-1 0758 Clouds 25% WS&DIR 20 @ 3-5
Operating normally. Renewed chart. No problems.

POMERINCK 0830 Clouds 30% WS&DIR 40 @ 4-6
Chart jammed. No data. Knew by now that the problem had to be electrical rather than mechanical. Testing revealed heavy corrosion on battery input jack to recorder. Cleaned and tested...seems O.K. Hope this will cure the problem. Also renewed this chart.

LOUGHLIN 0900 Clouds 50% WS&DIR 40 @ 4-6
Operating normally. Renewed chart and replaced pen.

J-229 Friday, 8-17-90

SOH-1 0905 Clouds 90% WS&DIR 350 @ 4-6
Operating O.K., but chart speed was inadvertantly left on 10 cm/hr instead of 2 cm/hr. so pen ran dry and some data was lost. Replaced pen, ran full calibration. Adjusted meter to 110.0 from 109.5, adjusted chart recorder down 2 db.

POMERINCK 0940 Clouds 80% WS&DIR 30 @ 3-5
Operating normally. Replaced batteries. Calibrated meter to 110.0 from 109.8. Adjusted recorder up 3 db.

LOUGHLIN 1010 Clouds 90% WS&DIR 80 @ 4-6
Operating normally. Checked calibration prior to removal of sound meter and recorder for bench testing.

SPECIAL
Purchased 7 amp. battery and a trickle charger from Western Auto, and a tape-recorder, microphone and tapes from Radio Shack.
Tested current-draw of tape recorder, chart recorder and sound meter with following results:

Sound meter.	+9 volt side, 21 to 24 ma.		
	-9 volt side, 15 to 18 ma.		
	each converter	27 ma.	
	Total battery draw through converters		96 ma.
Chart recorder.			290 ma.
Tape recorder.	Playback	96 ma.	
	Recording	137 ma.	
	Stand-by	64 ma.	
	Average normal use		100.ma.

Total current draw from 12 volt system is 486 ma. continuous. This equates to 12 x .486 = 5.83 watts/hour or 140 watts/day. In other words, a solar panel would have to be a minimum of 140 X 20% = 168 watts capacity.

Saturday & Sunday 8-18 & 8-19

Designed, built and tested a Diode voltage dropping device for the Sound meter. It works great. Total current draw from each battery now averages 20 ma., or 40 ma. for both. This is down from 96 ma. draw through the converters and will double the battery life and reduce the size of the Solar panel.

Also tested AC powered trickle charger to chart recorder with sound meters also hooked-up to AC. This also works great. When AC voltage goes off, the chart recorder continues running but the trace drops to Zero which will show length of time that the power was off. When AC comes back on, the recorder continues without a blip, and the trace goes back to the normal sound level.

The sound recorder required extensive testing to determine the most accurate and practical volume level on the recorder and the placement of the sound-meter microphone (during playback), to duplicate as closely as possible the original sound trace. The major problem here however, is the excessive current draw of the tape-recorder in the standby mode. 68 ma. This will really drain a battery or require a sizeable solar panel. My suggestion is to all Pomerinck to turn-on the record-mode when necessary for periods of 10-15 minutes when necessary, and announce the time on and time off into the mike, leaving all other controls alone.

This will result in the following:

Sound meter total current draw	40 ma.
Chart recorder	290 ma.
Tape recorder (estimated avg. use)	20 ma.

Total current draw from 12 volt system would be 350 ma. This equates to (P=IV) 12 X .35 = 4.2 watts/hour or 4.2 X 24 = 100.8 watts/day. In other words, an M-25 panel should do the job.

J-232 Monday, 8-20-90

SOH-1 Clouds 35% WS&DIR 50 @ 5-7

Operating normally. Installed trickle-charger and battery for chart recorder.

POMERINCK Clouds 35% WS&DIR 25 @ 4-6

Operating normally but pen ran dry and lost some data. Replaced batteries and installed new design regulator. Also replaced pen. Was unable to install tape recorder because Pomerincks were not at home.

LOUGHLIN Clouds 40% WS&DIR 50 @ 4-6

Re-installed chart recorder and sound meter. Checked calibration and normal operating. O.K.

J-234 Wednesday, 8-22-90

SOH-1 0755 Clouds 70% WS&DIR 290 @ 4-6
Many power outages during the last 48 hours at the sound meter shelter. These were caused by Rig circuit breaker tripping because of moisture at the cable connector. Cleaned and taped connector to prevent moisture. Chart recorder continued to run off battery during outages.

POMERINCK 0829 Clouds 95%, rain WS&DIR 310 @ 2-4
Operating normally. Batteries holding up fine.

LOUGHLIN 0857 Clouds 90%, rain WS&DIR 320 @ 2-4
Operating normally. No problems

J-236 Friday, 8-24-90

SOH-1 0900 Clouds 100%, rain WS&DIR 310 @ 4-5
Sound meter O.K., but chart recorder inoperative. Found battery completely flat. Obviously, the trickle charger is not adequate to both keep battery charged and cover the current draw of the chart recorder. Re-attached the recorder to the direct converter and restored operation. Replaced pen, chart. Complete calibration. Adjusted meter to 110.0 from 109.6. Increased recorder 1 db.

POMERINCK 0935 Clouds 100% WS&DIR 315 @ 3-5
Operating normally. Replaced recorder battery. Sound meter battery O.K. Ran full calibration. No adjustments were required for either meter or recorder. Installed the Tape recorder and instructed Debbie Pomerinck in its use.

LOUGHLIN 1040 Clouds 100% WS&DIR 90 @ 4-5
Operating normally. Chart and Pen O.K. Full calibration. Adjusted sound meter to 110.0 from 109.8. No adjustments were required for sound meter.

J-239 Monday 8-27-90

SOH-1 0750 Clouds 60% WS&DIR 350 @ 4-6
Chart folded under in the recorder. Lost some data. Installed modified trickle-charger and battery. Tested O.K. Checked station operation. O.K.

POMERINCK 0830 Clouds 80% WS&DIR 330 @ 6-8
Operating normally. Replaced recorder battery. Meter batteries still O.K. Tape recorder had no use although Mrs. Pomerinck said there was noise Saturday night.

LOUGHLIN 0900 Clouds 70% WS&DIR 360 @ 10-15
Improper operation. Meter and recorder running about 75 to 80 db. No response to noise impulse. Cables tested O.K. Replaced Microphone and operation was restored, but I think readings are still too high. This may be due to wind which is gusting to over 20 mph. Hoping for the best.

J-241 Wednesday 8-29-90

SOH-1 0900 Clouds 100% rain WS&DIR 300 @ 2-4
Operating normally. Trickle-charger now doing fine.

POMERINCK 0920 Clouds 100% rain WS&DIR 300 @ 2-4
Chart jammed. No data for 48 hours. Cleared jam and tested. Replaced meter batteries. (more than double the normal life) Tape recorder operated from 0 to 238 on counter, volume was turned up full despite caution to Pomerincks not to adjust settings. They were not at home, so could not talk to them.

LOUGHLIN 0950 Clouds 100% rain WS&DIR 300 @ 2-4
Just garbage. Readings 70-80 db. I don't know whats wrong. Too much rain to fool around at the station, so I removed everything to work on at home.

J-242 Thursday 8-30-90

LOUGHLIN INSTRUMENTS.
Tested for several hours using internal batteries in sound meter. Everything fine--couldn't make anything fail. Tested with D.C. converters and began having problems. Close examination revealed that the connections to the battery snaps on one of the converters had badly corroded. Also found that when the negative battery supply fails, the meter records high to off-scale. When the positive battery supply fails, the meter records low to off-scale. In other words, the negative supply didn't fail, but dropped below 7 volts due to corrosion causing the meter and the chart recorder to read high. Garbage..I replaced battery connectors, soldered and weatherproofed the joint, then retested for several hours. All O.K. Will reinstall the instruments tomorrow.

J-243 Friday 8-31-90

SOH-1 0855 Clouds 5% WS&DIR 280 @ 4-6
Operating normally. Full calibration. Adj. meter to 110.0 from 110.6. No Adj. to recorder. Chart,Pen & Batt. O.K.

POMERINCK 0925 Clouds 5% WS&DIR 310 @ 5-7
Operating normally. Full Calibration. No adj to sound meter. Adj. chart recorder up 2db. Tape recorder ran from 238 to 452. Replaced chart recorder battery. Meter batteries O.K.

LOUGHLIN 1005 Clouds 10% WS&DIR 360 @ 4-6
Installed instruments. Tested and calibrated. Everything seems O.K.

DAILY AVERAGE, MAXIMUM AND TOTAL H2S READINGS

August 1 To August 31, 1990

	Gilman			SOH-1			Woods		
Date	Avg	Max	Total	Avg	Max	Total	Avg	Max	Total
0801	2	2	37	1	2	24	2	2	34
0802	2	3	38	1	2	18	1	2	28
0803	1	3	33	1	2	22	2	3	36
0804	2	3	42	1	2	25	2	3	40
0805	2	2	40	1	2	21	2	3	41
0806	2	3	43	1	2	32	2	3	40
0807	2	3	44	2	3	36	2	3	42
0808	2	3	39	1	3	33	1	2	35
0809	2	3	43	2	3	38	1	3	32
0810	2	3	40	2	2	37	2	3	36
0811	2	3	36	1	2	33	2	3	43
0812	2	3	41	1	2	28	2	3	44
0813	1	2	26	2	3	46	2	3	37
0814	1	2	28	2	3	39	1	3	34
0815	1	2	26	2	3	38	1	2	31
0816	1	2	35	1	2	33	1	3	35
0817	2	3	36	1	3	28	2	3	36
0818	2	3	38	1	3	32	2	3	44
0819	2	3	37	2	3	43	2	3	38
0820	2	3	38	1	3	31	2	3	48
0821	2	3	39	1	2	20	2	2	44
0822	2	3	40	1	2	16	2	3	44
0823	1	2	25	1	2	27	2	3	44
0824	1	2	23	1	2	31	2	2	40
0825	1	3	23	1	2	30	2	2	42
0826	0	1	1	1	2	34	2	3	41
0827	1	2	15	1	2	33	2	2	38
0828	1	1	19	2	3	40	1	3	35
0829	1	2	29	1	3	34	1	2	32
0830	2	3	39	2	3	45	2	3	37
0831	2	3	36	1	3	25	2	3	47
	2	3	1029	1	3	972	2	3	1201

All readings are in parts per billion (ppb)

H2S CHART REDUCTION -- WOODS Station

From 8-1-90 to 8-31-90

HOUR:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max	Total
0801	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	37
0802	1	1	1	2	2	1	1	1	1	2	2	2	2	2	2	2	1	0	1	0	0	0	0	1	1	2	28
0803	1	1	1	1	1	1	2	2	3	3	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	3	36
0804	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	1	1	0	0	0	1	1	2	2	2	3	40
0805	1	1	1	1	2	2	2	2	3	2	3	3	3	2	2	1	1	1	0	1	1	2	2	2	2	3	41
0806	2	1	1	2	2	2	2	2	2	3	3	2	2	2	2	1	1	1	0	1	1	1	2	2	2	3	40
0807	2	2	2	2	2	2	2	2	2	2	3	2	2	3	2	1	1	1	0	1	1	1	2	2	2	3	42
0808	2	2	2	1	1	1	2	2	2	‡	2	2	1	1	1	2	1	2	1	2	2	1	1	1	1	2	35
0809	1	1	2	1	1	2	1	2	2	2	2	3	2	2	2	1	2	2	1	0	0	0	0	0	1	3	32
0810	0	1	1	1	1	1	2	2	2	2	2	2	3	2	2	2	1	2	1	1	1	1	1	2	2	3	36
0811	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	1	1	1	1	2	3	43
0812	2	2	2	2	3	2	1	3	3	1	2	2	1	2	1	1	2	2	1	2	2	1	2	2	2	3	44
0813	2	2	2	1	1	2	2	2	2	3	3	2	2	2	2	1	1	0	1	0	1	1	1	1	2	3	37
0814	1	2	2	1	1	2	2	2	2	3	3	2	2	1	2	2	1	1	0	0	0	0	1	1	1	3	34
0815	1	1	1	2	2	2	1	2	2	2	2	1	2	2	2	2	1	1	0	0	0	0	1	1	1	2	31
0816	1	1	2	2	2	1	2	3	2	1	2	3	2	2	2	2	1	1	0	0	1	1	0	1	1	3	35
0817	1	1	1	1	2	2	2	1	2	2	3	2	2	2	2	1	2	1	1	1	1	1	1	1	2	3	36
0818	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	1	1	1	0	0	0	2	3	44
0819	1	1	1	2	2	2	2	3	2	3	2	3	2	2	2	2	1	1	0	0	1	1	1	1	2	3	38
0820	1	1	2	2	2	2	2	3	3	3	3	2	2	2	2	2	2	1	1	2	2	2	2	2	2	3	48
0821	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	44
0822	2	2	2	2	2	2	2	2	2	3	2	3	3	2	2	1	2	1	1	1	1	1	2	1	2	3	44
0823	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	1	1	1	2	3	44
0824	1	2	1	2	2	2	2	1	1	2	2	2	2	2	2	1	1	1	2	1	2	2	2	2	2	2	40
0825	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	0	1	1	2	2	2	2	42
0826	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	3	41
0827	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	1	0	1	1	1	2	1	2	2	2	38
0828	2	2	2	2	3	2	2	2	2	2	2	2	2	2	1	1	0	0	1	1	1	1	0	0	1	3	35
0829	0	0	0	1	2	2	2	2	2	2	2	2	2	2	2	1	1	0	0	0	1	2	2	2	1	2	32
0830	2	2	2	2	2	2	2	2	3	2	2	2	2	2	1	1	0	1	1	0	0	1	1	2	2	3	37
0831	2	2	2	2	3	3	3	3	3	3	3	2	2	2	3	2	1	0	0	1	1	1	1	2	2	3	47
																											1201
AVG.	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2		
MAX.	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	2	2	2	2	2		3	

‡‡=Power or Equip. failure: ‡=Calibration

H2S CHART REDUCTION -- SOH-1 Station

From 8-1-90 to 8-31-90

HOUR:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max	Total
0801	1	1	1	1	1	1	2	2	2	1	1	0	1	1	0	0	1	1	2	1	1	1	1	0	1	2	24
0802	0	1	0	1	0	0	0	0	1	1	1	1	1	1	2	2	1	1	1	0	0	1	1	1	1	2	18
0803	1	1	0	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	0	1	1	0	0	1	1	2	22
0804	1	1	0	0	2	1	1	1	2	2	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1	2	25
0805	1	1	1	0	1	1	1	1	1	1	1	0	2	1	1	1	1	1	1	1	0	1	1	0	1	2	21
0806	1	1	1	1	2	1	1	2	2	2	1	2	2	2	2	1	1	2	1	1	1	1	1	0	1	2	32
0807	0	1	1	1	1	1	2	2	1	2	2	2	2	2	2	3	2	2	2	1	1	1	1	1	2	3	36
0808	0	0	1	1	1	1	1	2	2	2	2	3	1	2	1	2	1	2	1	1	1	2	1	2	1	3	33
0809	1	1	1	1	1	1	1	0	1	1	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	3	38
0810	2	2	2	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	1	2	1	2	2	1	2	2	37
0811	0	0	1	1	1	0	1	1	2	2	2	2	2	1	2	2	2	2	2	2	1	1	1	2	1	2	33
0812	2	1	1	2	1	1	1	0	0	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	2	28
0813	1	1	1	1	1	1	3	3	3	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	3	46
0814	2	1	1	1	1	1	1	1	1	1	2	3	2	2	2	2	3	3	2	1	2	2	1	1	2	3	39
0815	2	2	2	2	1	0	0	1	2	3	1	2	1	2	2	2	2	2	2	2	2	1	1	1	2	3	38
0816	1	1	1	1	1	1	1	1	1	2	2	1	2	2	2	1	1	2	2	1	2	1	2	1	1	2	33
0817	1	0	0	1	1	0	0	1	0	1	1	1	1	3	2	2	2	2	2	2	2	1	1	1	1	3	28
0818	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	3	3	2	2	2	2	2	2	2	1	3	32
0819	1	1	1	1	1	1	0	1	2	1	2	2	3	3	3	2	3	3	2	3	2	2	2	1	2	3	43
0820	1	2	1	2	2	2	2	2	2	2	2	3	1	1	1	1	0	0	1	1	1	0	1	0	1	3	31
0821	0	0	2	1	1	1	1	1	2	2	2	2	1	1	1	1	0	0	0	0	0	1	0	0	1	2	20
0822	0	0	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	0	2	1	1	1	1	0	1	2	2	1	1	1	1	1	1	2	16
0823	1	1	1	1	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	27
0824	1	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	31
0825	1	1	1	1	0	0	0	1	1	2	1	2	2	2	2	1	2	2	2	1	2	1	1	1	1	2	30
0826	1	1	1	1	1	1	0	‡	2	1	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	2	34
0827	0	1	1	1	0	1	1	1	2	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	2	33
0828	1	1	1	1	1	2	1	2	3	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	3	40
0829	1	1	1	1	0	1	1	1	2	1	2	1	1	1	1	1	2	2	2	3	2	2	2	2	1	3	34
0830	2	2	2	2	1	1	2	2	1	1	2	2	2	2	3	2	2	3	2	2	2	2	2	1	2	3	45
0831	1	1	0	0	0	1	1	1	2	3	2	2	2	2	2	1	1	0	1	0	0	1	1	0	1	3	25
																											972
AVG.	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1		
MAX.	2	2	2	2	2	2	3	3	3	3	2	3	3	3	3	3	3	3	2	3	2	2	2	2		3	

‡‡=Power or Equip. failure: ‡=Calibration

H2S CHART REDUCTION -- GILMAN Station

From 8-1-90 to 8-31-90

HOUR:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max	Total
0801	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	2	1	2	1	1	2	2	2	2	37
0802	2	2	2	1	1	1	1	1	1	2	2	2	3	3	2	1	2	2	2	2	1	0	1	1	2	3	38
0803	1	0	1	1	0	1	1	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	2	2	1	3	33
0804	2	2	2	1	2	2	2	2	3	2	3	2	2	2	2	2	1	0	0	1	2	2	1	2	2	3	42
0805	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	0	0	0	2	2	2	2	2	2	2	40
0806	2	1	1	1	1	2	1	2	2	2	3	2	3	3	2	2	2	2	1	1	1	2	2	2	2	3	43
0807	2	2	2	1	1	2	2	2	2	2	3	3	2	3	2	2	2	1	1	1	1	2	2	1	2	3	44
0808	2	2	1	1	1	2	2	2	3	2	2	2	2	1	1	1	2	2	1	1	1	2	2	1	2	3	39
0809	2	2	2	1	2	1	2	2	2	2	3	2	3	2	2	2	1	1	2	1	1	1	2	2	2	3	43
0810	2	1	2	2	2	1	2	2	2	1	1	3	2	3	2	2	2	2	2	1	1	1	0	1	2	3	40
0811	2	1	2	2	1	1	1	2	2	2	3	2	3	2	2	2	‡‡	‡‡	‡‡	‡‡	2	2	1	1	2	3	36
0812	1	2	1	1	1	1	1	2	2	2	3	2	2	2	2	2	2	2	2	1	2	2	2	1	2	3	41
0813	1	0	1	2	2	2	2	1	1	1	2	2	2	2	1	1	1	1	0	0	1	0	0	0	1	2	26
0814	0	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	1	1	0	0	1	0	1	1	1	2	28
0815	1	1	0	1	1	1	1	2	2	1	2	2	2	2	1	1	1	0	0	0	1	1	1	1	1	2	26
0816	2	1	1	2	1	1	1	1	2	2	2	2	2	1	2	1	2	1	1	1	1	2	2	1	1	2	35
0817	1	1	2	1	2	2	1	2	2	3	2	3	2	2	‡‡	‡‡	‡‡	2	2	1	1	1	1	2	2	3	36
0818	2	1	1	2	2	1	2	2	1	2	3	2	2	2	1	2	1	2	1	0	1	1	2	2	2	3	38
0819	1	2	2	2	2	2	2	2	2	3	3	2	2	2	2	1	1	0	0	0	1	1	1	1	2	3	37
0820	1	1	2	1	2	2	2	2	3	2	2	2	2	2	2	1	1	1	0	2	1	1	1	2	2	3	38
0821	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	1	0	0	1	1	2	2	2	2	39
0822	2	1	2	2	2	1	1	1	2	2	3	3	1	2	2	2	2	2	2	1	1	1	1	1	2	3	40
0823	1	1	0	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	0	1	1	1	1	1	1	2	25
0824	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	0	0	1	0	1	1	1	1	1	2	23
0825	1	0	0	0	1	1	1	0	1	1	2	2	3	1	2	1	1	1	1	1	1	1	0	0	1	3	23
0826	1	0	0	0	0	0	0	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	0	1	1
0827	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	‡‡	2	1	1	1	1	1	1	0	1	1	1	1	1	2	1	2	15
0828	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	19
0829	1	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	0	0	1	1	1	2	1	2	29
0830	2	2	2	2	2	1	1	2	2	3	2	2	2	2	2	2	2	1	1	0	1	1	1	1	2	3	39
0831	2	1	1	2	2	2	2	3	3	3	3	2	2	2	2	2	1	0	0	0	0	0	1	0	2	3	36
																											1029
AVG.	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2		
MAX.	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2		3	

‡‡=Power or Equip. failure: ‡=Calibration

Synopsis of Average Daily Meterological Station Readings

08/1989

	T. P. MET					WOODS MET						
DAY	TEMP	WD	WS	RAIN	RH	TEMP	WD	WS	RAD	RAIN	RH	SIGMA
01	23.4	343	4.9	0.04	-	23.5	327	3.1	78	0.07	-	35.5
02	24.3	344	5.4	0.00	-	24.6	38	3.2	160	0.00	-	45.3
03	23.2	324	4.8	0.18	-	23.4	12	3.0	92	0.11	-	35.5
04	24.0	327	5.0	0.00	-	24.3	18	3.1	220	0.01	-	39.7
05	23.7	334	5.8	0.01	-	24.1	11	3.0	172	0.00	-	43.8
06	23.6	321	6.2	0.15	-	24.1	353	3.6	184	0.11	-	44.8
07	24.4	344	5.7	0.22	-	24.7	354	3.2	190	0.13	-	48.3
08	24.0	8	6.7	0.08	-	24.5	18	3.5	122	0.04	-	54.2
09	24.0	336	4.7	0.04	-	24.2	2	3.3	186	0.18	-	44.2
10	23.6	332	4.9	0.00	-	23.6	334	2.9	142	0.00	-	43.8
11	24.0	322	5.3	0.03	-	23.5	330	3.3	182	0.06	-	42.1
12	23.0	313	4.9	0.46	-	22.6	334	3.5	82	0.88	-	23.8
13	24.6	347	4.8	0.00	-	25.3	349	3.1	192	0.00	-	32.9
14	24.3	336	6.5	0.28	-	24.8	28	3.6	184	0.35	-	36.6
15	24.5	360	5.8	0.24	-	25.0	31	3.1	188	0.27	-	50.4
16	23.7	354	5.3	0.07	-	24.1	24	3.3	140	0.06	-	48.6
17	23.9	332	4.5	0.10	-	24.0	18	3.4	184	0.01	-	39.6
18	24.2	313	5.9	0.07	-	23.7	344	3.5	206	0.02	-	37.4
19	24.4	344	6.1	0.04	-	23.9	354	3.1	152	0.08	-	40.3
20	24.7	335	5.2	0.01	-	24.4	349	3.7	184	0.01	-	40.0
21	24.7	342	5.7	0.22	-	24.3	350	3.7	198	0.13	-	44.1
22	24.0	347	5.9	0.18	-	23.5	349	3.1	120	0.24	-	41.6
23	24.1	320	4.8	0.14	-	24.5	333	3.1	192	0.26	-	33.9
24	24.5	341	5.9	0.46	-	25.3	9	4.0	120	0.47	-	42.3
25	24.5	316	5.9	0.09	-	25.1	10	4.3	186	0.05	-	43.4
26	24.2	321	8.1	0.29	-	24.6	341	5.8	122	0.16	-	34.5
27	23.9	287	8.4	0.04	-	24.6	349	5.8	184	0.04	-	18.8
28	24.3	302	6.7	0.01	-	25.3	341	4.4	194	0.00	-	29.0
29	22.9	293	6.2	0.03	-	23.6	331	4.3	124	0.03	-	23.4
30	23.2	295	6.1	0.00	-	24.1	344	3.9	210	0.01	-	27.0
31	23.6	316	4.9	0.00	-	23.8	303	3.2	160	0.00	-	30.2
AVG	24.0	329	5.7	0.11	0	24.2	355	3.6	163	0.12	0	38.5
MAX	24.7	-	8.4	0.46		25.3	-	5.8	220	0.88		54.2
MIN	22.9	-	4.5	0.00	1000	22.6	-	2.9	78	0.00	1000	18.8
TOT				3.48					5050	3.78		

Meteorology Station Log
SOH-4
8-1-90 to 8-31-90

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0801		0802		0803		0804	
0000	280	3	305	2	275	4	300	4
0100	275	3	315	2	280	5	295	3
0200	280	2	360	3	270	4	290	4
0300	290	2	285	3	350	3	310	4
0400	290	2	295	2	10	3	330	5
0500	295	3	295	2	15	4	10	6
0600	295	2	320	3	45	4	35	7
0700	290	3	310	3	60	5	20	7
0800	310	4	315	4	65	6	40	8
0900	300	3	10	4	65	7	45	8
1000	295	4	360	5	40	7	40	7
1100	80	6	40	7	35	6	50	8
1200	80	6	55	7	30	5	50	8
1300	80	6	50	6	360	4	40	7
1400	75	7	40	5	310	4	25	5
1500	80	6	40	5	310	5	20	4
1600	75	5	45	7	310	4	10	2
1700	45	6	30	4	310	4	15	2
1800	40	4	40	3	320	3	15	3
1900	25	3	350	3	315	3	360	3
2000	315	2	310	3	320	3	300	3
2100	300	2	295	2	310	2	285	4
2200	300	2	285	3	310	3	285	3
2300	310	2	300	4	305	3	280	4

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0805		0806		0807		0808	
0000	280	4	5	2	20	5	350	2
0100	280	4	315	3	20	5	30	4
0200	280	4	285	3	15	5	40	3
0300	295	3	290	4	40	7	285	2
0400	315	3	285	4	350	4	315	4
0500	315	2	280	3	80	3	55	2
0600	285	4	325	4	115	3	65	2
0700	315	5	280	6	335	2	55	6
0800	30	6	285	4	310	3	60	7
0900	45	7	345	5	350	4	60	8
1000	40	8	30	7	20	5	50	8
1100	50	8	40	8	30	7	45	8
1200	45	9	40	7	45	8	50	9
1300	45	8	45	8	40	8	55	9
1400	45	8	55	8	45	7	55	9
1500	45	9	50	8	45	8	85	5
1600	50	8	40	7	40	8	50	6
1700	40	5	30	7	50	8	45	5
1800	25	4	20	5	40	5	50	5
1900	25	4	5	4	35	4	65	6
2000	20	3	360	4	25	3	65	5
2100	15	3	355	4	360	2	50	4
2200	10	3	330	4	35	3	45	3
2300	20	2	350	5	320	2	25	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0809		0810		0811		0812	
0000	25	2	20	2	290	2	275	2
0100	5	2	20	2	285	2	280	3
0200	275	2	360	2	285	2	280	4
0300	275	2	360	2	285	2	285	3
0400	280	3	275	3	280	3	285	3
0500	280	2	280	4	280	3	290	2
0600	275	3	300	3	275	3	300	3
0700	280	4	340	3	305	3	290	3
0800	335	47	345	5	325	4	285	3
0900	50	5	340	5	15	6	310	4
1000	60	7	350	4	20	6	310	4
1100	60	7	50	8	30	8	320	4
1200	60	8	50	8	40	8	20	5
1300	55	7	45	7	25	7	40	3
1400	55	8	40	7	30	8	50	4
1500	50	7	45	7	25	7	320	3
1600	40	4	45	7	20	6	300	3
1700	40	3	40	6	15	4	340	3
1800	35	3	30	4	15	3	315	3
1900	40	4	30	3	10	3	295	2
2000	20	2	10	2	320	2	280	2
2100	20	2	10	2	290	2	30	2
2200	20	2	10	2	310	3	370	2
2300	20	2	290	2	280	2	80	2

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0813		0814		0815		0816	
0000	95	2	300	3	70	3	285	2
0100	95	2	285	3	55	2	290	3
0200	95	2	310	3	65	3	290	3
0300	95	2	315	3	85	3	290	3
0400	80	2	320	4	35	3	295	3
0500	90	2	310	3	340	2	300	3
0600	90	2	315	5	50	3	300	2
0700	85	2	320	5	45	4	25	3
0800	335	4	335	6	45	6	40	5
0900	25	4	355	6	50	7	40	6
1000	45	6	20	5	50	7	50	8
1100	50	6	65	5	50	8	60	9
1200	55	7	60	6	45	7	60	8
1300	45	7	70	7	55	8	55	7
1400	60	7	65	7	45	8	30	5
1500	65	6	60	6	45	7	70	5
1600	55	5	55	5	50	7	65	6
1700	60	4	40	5	65	6	55	5
1800	30	3	45	4	70	4	70	4
1900	5	3	360	2	60	3	60	5
2000	315	3	360	2	300	3	60	3
2100	295	3	330	3	295	2	45	3
2200	300	3	40	3	280	2	40	2
2300	305	3	55	5	280	2	35	3

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0817		0818		0819		0820	
0000	340	2	295	2	305	2	285	2
0100	310	2	285	3	285	3	280	3
0200	310	2	295	4	280	3	290	3
0300	310	3	290	3	280	3	285	2
0400	300	3	285	2	280	2	290	2
0500	310	3	280	4	280	3	290	3
0600	290	3	280	3	275	2	325	4
0700	285	3	285	3	265	3	15	5
0800	295	3	300	3	275	3	20	5
0900	35	5	315	3	295	3	40	6
1000	360	6	360	4	45	4	30	4
1100	30	6	25	6	70	4	25	3
1200	40	7	35	7	90	4	20	3
1300	40	7	35	7	85	5	340	3
1400	45	7	30	6	70	5	310	4
1500	45	8	25	6	65	5	335	2
1600	40	8	40	7	55	5	330	2
1700	40	7	45	7	55	4	280	2
1800	35	6	25	6	50	3	295	2
1900	30	4	30	5	55	2	290	3
2000	25	3	15	3	55	2	275	3
2100	10	2	360	2	50	2	285	4
2200	5	2	315	3	350	2	295	3
2300	310	2	320	3	285	2	310	4

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0821		0822		0823		0824	
0000	340	4	-	-	130	2	300	2
0100	10	5	290	3	80	3	245	2
0200	35	6	290	2	340	2	275	2
0300	45	7	300	2	280	2	280	2
0400	50	8	310	3	290	3	270	2
0500	45	8	280	3	285	4	280	2
0600	45	8	285	5	275	4	290	3
0700	55	8	300	4	275	3	285	4
0800	50	8	335	5	300	4	295	4
0900	40	6	360	6	340	4	315	3
1000	40	4	40	6	20	5	20	6
1100	35	3	30	5	25	5	45	6
1200	30	3	50	6	30	6	45	6
1300	30	3	55	6	35	6	50	7
1400	35	3	50	7	30	7	60	7
1500	35	3	55	8	45	7	60	8
1600	45	2	60	7	20	5	60	7
1700	45	2	60	6	45	5	60	7
1800	-	-	80	4	50	4	60	7
1900	-	-	65	4	350	3	45	5
2000	-	-	85	5	290	3	40	4
2100	-	-	50	3	290	3	35	3
2200	-	-	120	3	285	3	30	3
2300	-	-	120	3	295	3	30	3

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0825		0826		0827		0828	
0000	25	3	335	5	10	4	290	3
0100	20	3	325	5	325	3	295	3
0200	315	2	340	5	300	4	290	3
0300	310	2	330	4	295	3	300	3
0400	315	2	315	4	290	4	305	3
0500	290	2	310	4	310	4	310	3
0600	285	2	305	4	300	4	295	3
0700	330	5	290	5	300	4	315	4
0800	310	2	320	6	310	5	340	5
0900	325	4	325	5	350	7	360	7
1000	315	5	345	6	10	8	30	7
1100	325	5	350	6	15	8	35	8
1200	40	7	355	6	5	8	35	8
1300	45	8	15	7	5	8	30	7
1400	55	8	35	8	10	7	35	7
1500	30	8	30	8	360	7	30	8
1600	25	7	25	7	360	6	25	7
1700	25	7	20	7	350	7	10	5
1800	15	6	40	8	340	5	360	3
1900	15	5	45	8	320	5	320	3
2000	10	4	35	6	280	4	295	4
2100	10	5	20	5	280	4	290	3
2200	10	5	20	5	285	4	290	3
2300	345	5	15	4	280	4	295	3

Time	W/D	W/S	W/D	W/S	W/D	W/S	W/D	W/S
	0829		0830		0831			
0000	300	3	310	3	280	4		
0100	300	3	310	3	275	3		
0200	305	3	315	3	275	3		
0300	310	3	310	3	275	3		
0400	295	2	315	3	275	3		
0500	290	2	310	4	275	2		
0600	285	2	305	4	275	2		
0700	300	2	345	5	280	3		
0800	285	2	355	7	290	4		
0900	310	4	360	7	340	4		
1000	335	3	5	8	20	5		
1100	360	5	5	8	25	5		
1200	20	6	5	8	45	6		
1300	20	7	15	7	30	6		
1400	20	7	10	8	40	6		
1500	15	7	15	7	35	6		
1600	15	5	15	7	25	5		
1700	340	4	10	6	20	3		
1800	315	5	360	3	20	2		
1900	295	4	315	3	20	2		
2000	300	4	290	2	20	2		
2100	310	5	280	3	20	2		
2200	315	4	280	3	250	2		
2300	305	3	280	3	240	2